

REMARKS/ARGUMENTS

The amendments to Claim 1 are supported by Examples 3 and 4 at specification page 24 where 30/50 mixtures of PC-2/PC-3 provide support for amounts of PC-3 of 62.5% (PC-3/(PC-2 + PC-3)) and amounts of PC-2 of 37.5% (PC-2/(PC-2 + PC-3)),¹ and by Claim 3. New Claims 27 and 28 are supported by components (E) and (F) deleted from Claim 1. No new matter has been entered.

The present invention relates to a polycarbonate resin composition and an injection-molded article which is made of the polycarbonate resin composition. The claimed polycarbonate resin composition comprises:

(A) 10 to 62.5 mass% aromatic polycarbonate resin (A-1) in which dihydroxybiphenyl is used in an amount of 5 to 50 mol% with respect to the total amount of divalent phenol as a raw material in the formation of the aromatic polycarbonate resin and 90 to 37.5 mass% aromatic polycarbonate resin (A-2) which is an aromatic polycarbonate resin containing polyorganosiloxane, and

(B) amorphous styrene resin.

As explained and shown in the specification and in the Declarations of record herein, as well as in the newly obtained data explained at pages 11-12 herein, this polycarbonate resin composition exhibits not only an excellent balance among fluidity, rigidity, heat resistance, and impact resistance while maintaining flame retardance, but also provides excellent recycling efficiency. As such, injection-molded articles made from this polycarbonate resin composition are suitably used for automobile parts, housings for various kinds of articles or parts for office automation instruments, electrical and electronics instruments or home electric appliances.

¹ See page 21 for the definitions of PC-2 and PC-3.

Applicants appreciate the withdrawal of the rejection over Okamoto, Meyer and Reinert or Nodera.

The rejection over Okamoto in view of Gorny and Reinert is traversed.

Okamoto discloses in a second aspect of the disclosure a composition comprising 1-99% by weight of specific terminal modified PC resins in combination with 1-99% by weight of a styrenic resin. See [0158]. Paragraph [0135] discloses that the PC resins can include a PC-PDMS copolymer, and paragraphs [0001], [0007], [0008], [0013] and [0014] make it clear that this second aspect of the disclosure is focused in large part on providing flame retardant compositions. Okamoto does not suggest Applicants' presently claimed weight limits for (A-1) and (A-2), and only exemplifies the terminal modified polycarbonate to polycarbonate-polyorganosiloxane ratio as 75:25, 50:25, (Table II-1-(1)) 65:25, 10:80, 50:40 (Table II-2-(1)) and 50:50 (Tables III-1 and III-3). Importantly, Okamoto does not explicitly teach, use or suggest a content of dihydroxybiphenyl in the terminal modified polycarbonate as presently claimed for component (A-1) (5 to 50 mol% with respect to the total amount of divalent phenol).

Gorny teaches a copolycarbonate having 0.1 to 46 mol%, and most preferably 26 to 34 mol% of repeat units of reference formula (I), the preferred repeat unit of which is 4,4'-dihydroxydiphenyl (DOD). See [0021] and [0026]. However, the invention disclosed in Gorny only solves the technical problem of chemical resistance of multi-layered products and does not address flame retardancy. See [0041]. The description in [0019] that prior known copolycarbonates based on DOD and bisphenol A have flame retardance, etc., properties comparable with other known polycarbonates does not relate to Gorny's disclosure, and would not motivate an ordinarily skilled artisan to investigate the copolycarbonates disclosed in the mentioned references with a view towards modifying Okamoto. Moreover, Gorny neither discloses nor suggests that using the specifically claimed amount of

dihydroxybiphenyl in Applicants' (A-1) component could improve the flame retardance of the polycarbonate resin composition, nor is there any suggestion that Gorny's materials would be compatible with present component (A-2).

Reinert, cited as disclosing a perfluoroalkane sulfonate, is no longer pertinent to Claim 1 herein, and does not address the deficiencies of Okamoto and Gorny noted above. In a similar fashion, Nodera, also cited against the claim in a separate rejection in combination with Okamoto and Gorny and used for its disclosure of a metal salt, does not address the noted deficiencies of Okamoto and Gorny.

As described above, there is no motivation to combine Okamoto and Gorney in order to improve flame retardance and achieve the present invention. In addition, and as mentioned, Applicants have established the criticality of, and unexpected benefits flowing from, their required use of component (A-1) herein having 5 to 50 mol% with respect to the total amount of divalent phenol in their Declaration submitted November 12, 2008, providing Comparative Examples 11-14 which, in contrast to Examples 1 and 4 (Table A reproduced below) show the criticality of the claimed 5-50 mol% of dihydroxybiphenyl used in the formation of aromatic polycarbonate resin (A-1):

Table A

Components admixed (parts by mass)	Example 1	Example 4	Comparative example 11	Comparative example 12	Comparative example 13	Comparative example 14
(A)	PC-1	15		15		15
	PC-2		30		30	30
	PC-3	70	50			
	PC-4*			70	50	
	PC-5**				70	50
(B)	ABS-1		20		20	20
	ABS-2	15		15	15	
(C)	Talc		10		10	10
(E)	Metal salt-1	0.1		0.1		0.1
(G)	PTFE	0.5	0.5	0.3	0.3	0.3
Evaluation	SFL (260°C, 2 mm thick) (cm)	41	42	40	41	40
	Izod impact strength (kJ/cm ²)	70	45	75	50	20
	HDT (load: 1.83 MPa) (°C)	118	118	118	117	118
	Flexural strength (MPa)	60	92	60	91	62
	Flexural modulus (MPa)	2200	3450	2200	3400	2250
	Flame retardance (UL94, 1.5 mm thick)	V-0	V-0	V-1	V-1	V-0
	LOI	40	41	32	33	41

* PC-4: polycarbonate-biphenol copolymer having a viscosity average molecular weight of 17500 and a biphenol content of 3.0 mol%, obtained in the same manner as preparation Example 1 of the specification.

** PC-5: polycarbonate-biphenol copolymer having a viscosity average molecular weight of 17500 and a biphenol content of 70.0 mol%, obtained in the same manner as preparation Example 1 of the specification.

As shown by this data, when polycarbonate resin compositions that include polycarbonate resins falling within the scope of claim 1 (i.e., wherein dihydroxybiphenyl is used in an amount of 5 to 50 mol% with respect to the total amount of divalent phenol as a raw material in the formation of the aromatic polycarbonate resin), the obtained molded articles have excellent flame retardance and impact resistance. However, when polycarbonate resin compositions that include polycarbonate resins falling outside the scope of claim 1 (e.g., 3.0 and 70.0 mol% biphenol content), the obtained molded articles have

inferior flame retardance and impact resistance. As none of the references of record alone or in combination disclose or suggest Applicants' claimed polycarbonate resin composition including component (A-1) being an aromatic polycarbonate resin wherein dihydroxybiphenyl is used in an amount of 5 to 50 mol% with respect to the total amount of divalent phenol as a raw material in the formation of the aromatic polycarbonate resin, Applicants' claims are neither anticipated nor rendered obvious by the references.

In addition, Applicants have prepared further data in the form of Comparative Examples A to C, using the same (A-1) and (A-2) components as Example 3 of the present invention, and evaluated the performance of these compositions in accordance with the procedures set out in the specification.

In this new data set Comparative Example A falls outside the scope of amended Claim 1 in view of the ratio of (A-1) to (A-2). Comparative Example B contains only (A-1) as component (A), and Comparative Example C contains only (A-2) as component (A) of the present application:

Components admixed (parts by mass)		Example 3	Comparative Example A	Comparative Example B	Comparative Example C
(A)	PC-1				
	PC-2 (PC-PDMS)	30(37.5)	12.5(11.1)		80(100)
	PC-3 (BP-PC)	50(62.5)	77.5(86.1)	80(100)	
(B)	ABS-1				
	ABS-2	20	10	20	20
	AS-1				
	AS-2				
(C)	Talc	10	10	10	10
(G)	PTFE	0.5	0.5	0.5	0.5
Evaluation	SFL (260°C, 2mm thick) (cm)	40	30	40	40
	Izod impact strength (kJ/cm ²)	45	30	15	60
	HDT (load; 1.83MPa) (°C)	125	125	125	123
	Flexural strength (MPa)	96	97	97	94
	Flexural modulus (MPa)	3500	3600	3600	3350
	Flame retardance (UL94, 1.5mm thick)	V-0	V-1	not V	V-1
	LOI	42	33	31	36

From the above Table, Example 3 has a flame retardance of V-0. On the contrary, none of Comparative Examples A, B and C achieve a flame retardance of V-0. Interestingly, each of (A-1) and (A-2) by itself has a low flame retardance, but by combining (A-1) and (A-2) in the specifically claimed ratio excellent flame retardance is achieved. This effect is unexpected to one of ordinary skill in the art. While not bound by theory, and only after discovering this unexpected property and considering it, this effect is believed to possibly be due to the production of SiO₂ when burning an aromatic polycarbonate resin containing polyorganosiloxane, which can be incorporated into a charred layer formed at the surface of the resin and form a barrier layer having excellent flame retardance. At the same time, the charred layer would be stiffened by dihydroxybiphenyl. In this way, there is a synergistic effect on flame retardance when both components (A-1) and (A-2) are present as claimed.

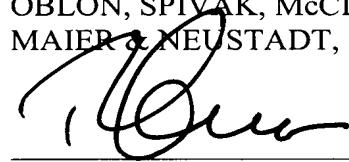
As nothing in the art suggests Applicants' presently claimed composition for the reasons explained above, and as nothing in the art suggests the benefits and unexpected

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results set forth in the original specification and multiple Declarations of record herein, Applicants respectfully submit that they have established the patentability of the present case and request the reconsideration and withdrawal of the outstanding rejections. A Notice of Allowance is earnestly solicited.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, L.L.P.



Richard L. Treanor
Attorney of Record
Registration No. 36,379

Customer Number
22850

Tel: (703) 413-3000
Fax: (703) 413 -2220
(OSMMN 07/09)